

No cold-wave signals were ordered during the month.

FORECASTS FOR 24 HOURS IN ADVANCE.

The forecasts for districts east of the Rocky Mountains for June, 1890, were made by Assistant Professor H. A. Hazen, and those for the Pacific coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps.

Percentages of forecasts verified, June, 1890.

States.	States.
Maine..... 68.4	Kentucky..... 86.1
New Hampshire..... 76.1	Ohio..... 82.6
Vermont..... 79.9	West Virginia..... 83.9
Massachusetts..... 76.3	Indiana..... 80.9
Rhode Island..... 77.8	Illinois..... 84.8
Connecticut..... 74.5	Lower Michigan..... 79.5
Eastern New York..... 77.8	Upper Michigan..... 76.3
Western New York..... 71.6	Wisconsin..... 75.9
Eastern Pennsylvania..... 82.8	Minnesota..... 72.3
Western Pennsylvania..... 80.3	Iowa..... 73.3
New Jersey..... 78.3	Kansas..... 79.1
Delaware..... 80.6	Nebraska..... 74.7
Maryland..... 85.4	Missouri..... 88.1
District of Columbia..... 84.5	Colorado..... 86.3
Virginia..... 84.5	North Dakota..... 72.7
North Carolina..... 84.4	South Dakota..... 79.5
South Carolina..... 84.3	Southern California*..... 92.6
Georgia..... 85.1	Northern California*..... 88.9
Eastern Florida..... 85.3	Oregon*..... 77.8
Western Florida..... 87.9	Washington*..... 79.5
Alabama..... 89.3	By elements: Weather..... 84.6
Mississippi..... 88.6	Temperature†..... 75.9
Louisiana..... 87.6	Monthly percentage of weather and temperature combined †..... 81.1
Texas..... 92.6	
Arkansas..... 85.7	
Tennessee..... 82.5	

* In determining the monthly percentage of weather and temperature combined, the Pacific coast states are not included. † The forecasts of temperature in districts east of the Rocky Mountains for June, 1890, were made with reference to the maximum temperature alone; that is, a prediction of warmer or cooler indicated that the maxi-

mum temperature of the day designated would be higher or lower than the maximum of the previous day. † The monthly percentage of weather and temperature combined is determined by multiplying the percentage of weather by 6, and the percentage of temperature by 4, and dividing their sum by 10.

FORECASTS FOR 48 AND 72 HOURS IN ADVANCE.

Appreciating the great importance that long time predictions possess for the general public the Chief Signal Officer has authorized forecasts for forty-eight and seventy-two hours, covering the second and third days in advance. Such forecasts are optional with the predicting officer, and are only made when clearly in the public interest, and cover, in all cases, considerable areas of country, and are not confined to localities.

Percentages of verifications of forecasts made for second day in advance. Number of predictions made: weather, 43; temperature, 102. Percentages of verifications: weather, 88.8; temperature, 72.2. Weather and temperature combined, 78.6. For third day in advance. Number of predictions made: weather, 6; temperature, 8. Percentages of verifications: weather, 91.7; temperature, 61.2. Weather and temperature combined, 77.4.

Percentages of verifications of weather and temperature signals reported by directors of the various State Weather Services for June, 1890.

States.	Weather.	Temperature.	States.	Weather.	Temperature.
Illinois..... 78.8	83.2	New Jersey..... 85.4	91.2		
Indiana..... 78.0	87.0	North and South Dakota..... 82.0	75.0		
Michigan..... 84.0	86.0	Ohio..... 80.0	87.0		
Minnesota..... 66.0	67.0	Pennsylvania..... 86.0	92.0		
Missouri..... 85.0	89.0	South Carolina..... 77.0	81.4		
Nebraska..... 93.1	85.2				

STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for June, 1890, of the directors of the various state weather services:

ALABAMA.

The month was hot and dry. **Temperature.**—Highest monthly mean, 83.3, at Goodwater; lowest monthly mean, 72.8, at Chepultepec; maximum, 99, at Gadsden, 80th; minimum, 50, at Jasper, 5th; greatest local monthly range, 43, at Jasper; least local monthly range, 17, at Chepultepec. **Precipitation.**—Greatest monthly, 5.92, at Uniontown; least monthly, 1.46, at Guntersville. **Wind.**—Prevailing direction, southeast.—Prof. P. H. Mell, Auburn, director; J. M. Quarles, Private, Signal Corps, assistant.

ARKANSAS.

Temperature.—The mean was about 1 above the normal; maximum, 106, at Lead Hill, 26th; minimum, 50, at Newport, 8th; greatest local monthly range, 49, at Lead Hill; least local monthly range, 28, at Conway. **Precipitation.**—The average was about 0.26 above the normal; greatest monthly, 9.29, at Little Rock; least monthly, 2.18, at Lead Hill.—M. F. Locke, Commissioner of Agriculture, Little Rock, director; W. U. Simons, Sergeant, Signal Corps, assistant.

COLORADO.

Temperature.—The mean was 3 above the average for the past four years; highest monthly mean, 74.5, at Lamar; lowest monthly mean, 43.8, at Leadville; maximum, 103, at Lamar, 22d; minimum, 12, at Breckenridge, 6th; greatest local monthly range, 71, at Breckenridge; least local monthly range, 37, at Cumbres. **Precipitation.**—There was about one-half the usual precipitation. **Wind.**—Prevailing direction, west.—Prof. F. H. Loud, Colorado Springs, director; W. S. Miller, Sergeant, Signal Corps, assistant.

ILLINOIS.

Temperature.—Highest monthly mean, 80.2, at Winnebago; lowest monthly mean, 70.0, at Sandwich; maximum, 104, at East Peoria, 25th, and at Pontiac, 27th; minimum, 40, at Aurora, 8th; greatest local monthly range, 60, at Pontiac; least local monthly range, 38, at Golconda and Pana. **Precipitation.**—Greatest monthly, 18.57, at Cockrell; least monthly, 2.10, at McLeansborough. **Wind.**—Prevailing direction, southwest.—John Craig, Sergeant, Signal Corps, Springfield, in charge.

INDIANA.

Temperature.—Highest monthly mean, 82.8, at Huntingburgh; lowest monthly mean, 70.2, at Valparaiso; maximum, 104, at Huntingburgh, 29th,

and at Muncie, 23d; minimum, 35, at Point Isabel, 8th; greatest local monthly range, 60, at Point Isabel; least local monthly range, 32, at Shelbyville. **Precipitation.**—Greatest monthly, 10.89, at Huntingburgh; least monthly, 2.26, at Mount Vernon. **Wind.**—Prevailing direction, southwest.—Prof. H. A. Huston, La Fayette, director; C. F. R. Wappenhans, Sergeant, Signal Corps, assistant.

IOWA WEATHER AND CROP SERVICE.

The month was the hottest, and in some localities, the wettest June in Iowa in the last twenty years. **Temperature.**—Highest monthly mean, 78.4, at Washington; lowest monthly mean, 67.7, at Iowa City; maximum, 106, at Glenwood, 21st; minimum, 44, at Wesley, 11th; greatest local monthly range, 56, at Glenwood; least local monthly range, 33, at Independence. **Precipitation.**—Greatest monthly, 16.53, at Fayette; least monthly, 1.57, at Oskaloosa. **Wind.**—Prevailing direction, south.—J. R. Sage, Des Moines, director; G. M. Chappel, Sergeant, Signal Corps, assistant.

KANSAS.

Temperature.—The temperature was above the normal in all parts of the state, the average excess being 3.8; highest monthly mean, 86.4, at Ellis; lowest monthly mean, 72.2, near Concordia; maximum, 120, at Collyer, 21st; minimum, 40, at Lakin, 4th and 7th, and at Allison, 9th; greatest local monthly range, 76, at Gibson; least local monthly range, 33, at Salina; greatest daily range, 53, at Lakin, 5th; least daily range, 9, at Leavenworth, 4th. **Precipitation.**—There was an excess in Decatur, Norton, Phillips, and Osborne counties, which extended southeastward, culminated in Harvey, and diminished in Sedgwick to Sumner county, where it changed to a deficiency. There was a deficiency of 2.63 in the eastern, and of 2.72 in the western division; greatest monthly, 8.20, at Halstead; least monthly, 0.20, at Gove City. **Wind.**—Prevailing direction, south.—Prof. J. T. Lovewell, Topeka, director; T. R. Jennings, Sergeant, Signal Corps, assistant.

KENTUCKY.

Temperature.—The mean was about 4 above the normal; maximum, 101, at Murray, 26th and 29th; minimum, 51, at Pellville, 8th; greatest monthly range, 49, at Murray and Pellville; least monthly range, 29, at South Fork. **Precipitation.**—The average was slightly in excess of the normal; greatest monthly, 9.66, at Shelbyville; least monthly, 1.20, at Canton. **Wind.**—Prevailing direction, southwest.—Dr. E. A. Grant, Louisville, director; Frank Burke, Sergeant, Signal Corps, assistant.

LOUISIANA.

Frequent excessive local rains occurred, particularly in the southern part of the state, and a very warm period during the latter part of the month.

Temperature.—The mean was 0.1 above the normal; highest monthly mean, 84.5, at Mandeville; lowest monthly mean, 78.2, at Maurepas; maximum, 101, at Mandeville, 14th, and at Cameron, 20th and 28th; minimum, 58, at Marks-ville, 2d, and at Clinton, 6th; greatest local monthly range, 39, at Clinton; least local monthly range, 24, at Emilie.

Precipitation.—The average was 2.02 above the normal; greatest monthly, 12.32, at Clinton; least monthly, 3.12, at Shreveport.

Wind.—Prevailing direction, south.—*R. E. Kerkam, Sergeant, Signal Corps, New Orleans, in charge.*

MICHIGAN.

The notable features of the month were the hot wave of the last seven days and the heavy local rainfalls.

Temperature.—The mean was 3.2 above the normal of the last fifteen years; highest monthly mean, 75.3, at Bangor; lowest monthly mean, 59.3, at Atlantic; maximum, 100, at Bangor, 28th; minimum, 31, at Roscommon, 8th; greatest local monthly range, 65, at Ivan; least local monthly range, 36, at Atlantic; greatest daily range, 48, at Grayling, 8th; least daily range, 4, at Grand Haven, 6th, and at Saint Ignace, 15th.

Precipitation.—The average was 0.34 below the normal of the last fifteen years; greatest monthly, 6.30, at Otsego; least monthly, 1.75, at Gaylord.

Wind.—Prevailing direction, southwest.—*N. B. Conger, Sergeant, Signal Corps, Lansing, director.*

MINNESOTA.

Temperature.—The temperature was 2 to 3 above the normal over the greater portion of the state, and in the northwestern counties the excess was about 7. In the vicinity of Lake Superior it was slightly below the normal; highest monthly mean, 71.3, at La Crosse, Wis.; lowest monthly mean, 57.5, at Duluth; maximum, 100, at Grand Meadow, 28th; minimum, 37, at Leech Lake, 7th; greatest local monthly range, 57, at Leech Lake; least local monthly range, 38, at Farmington and Rolling Green; greatest daily range, 43, at Saint Vincent, 7th; least daily range, 4, at Saint Vincent, 21st.

Precipitation.—In the southeastern portion of the state the rainfall exceeded that of any June during the last 18 years; greatest monthly, 13.05, at Redwood Falls; least monthly, 2.56, at Pine River Dam.

Wind.—Prevailing direction, southeast.—*John Healy, Corporal, Signal Corps, Saint Paul, in charge.*

MISSOURI.

Temperature.—Highest monthly mean, 79.9, at Miami; lowest monthly mean, 70.9, at Kirksville; maximum, 105, at Miami; minimum, 50.0, at Oregon and Kansas City.

Precipitation.—The rainfall was very irregular throughout the state, and there was no general rain during the month; greatest monthly, 4.58, at Kirksville; least monthly, 0.37, at Lamonte.—*Prof. Francis E. Nipher, Saint Louis, director.*

METEOROLOGICAL REPORT OF THE MISSOURI STATE BOARD OF AGRICULTURE.

The month has been remarkable for high temperature and small rainfall.

Temperature.—The mean temperature was 3.5 above the normal; highest monthly mean, 83.7, at Liberty; lowest monthly mean, 73.8, at Cassville; maximum, 106, at Protem, 26th, and Eldon, 30th; minimum, 44, at Glenwood, 6th; greatest local monthly range, 55, at Excelsior; least local monthly range, 30, at Windsor.

Precipitation.—The average was 3.00 below the normal; greatest monthly, 7.47, at Princeton; least monthly, 0.37, at Lamonte.

Wind.—Prevailing direction, south.—*Levi Chubbuck, Secretary of State Board of Agriculture, Columbia, director; A. L. McRae, Sergeant, Signal Corps, assistant.*

NEBRASKA.

The features of the month were the extremes in temperature and precipitation.

Temperature.—The mean was about 5 above the normal; maximum, 108, at Ansley and Theford; minimum, 32, at Alliance. A light frost was reported in connection with this minimum, but no damage has been reported.

Precipitation.—In the extreme western part of the state less than 1.00 fell, from there eastward the amount increased irregularly to the Missouri River. The greater part of the state received 3.00 or 4.00, although a limited region on the upper Niobrara received about 3. The greatest rainfall occurred in an area stretching east from Tekamah, where 18.70 fell.—*Prof. Goodwin D. Swezey, Crete, director; G. A. Loveland, Sergeant, Signal Corps, assistant.*

NEVADA.

The month has been one of the coolest and driest on record.

Temperature.—The mean was 4.1 below the normal; highest monthly mean, 84.5, at El Dorado Canyon; lowest monthly mean, 51.8, at Ruby Hill; maximum, 109, at El Dorado Canyon, 29th; minimum, 24, at Ruby Hill, 3d, and at Ely, 2d.

Precipitation.—The precipitation was the least on record for the state; the only portion in which precipitation fell was in the eastern and northern counties, where light amounts were reported on the last days of the month. A snowfall of 3.00 was reported at Ruby Hill, and 1.00 at Tuscarora.

Wind.—Prevailing direction, south.—*Prof. Chas. W. Friend, Carson City, director; H. E. Wilkinson, Corporal, Signal Corps, assistant.*

NEW ENGLAND METEOROLOGICAL SOCIETY.

Temperature.—The average was 1.8 below the normal; highest monthly mean, 68.7, at Northampton; lowest monthly mean, 54.0, at Eastport; maximum, 94, at Westborough, 24th; minimum, 26, at Berlin Falls, 3d; greatest local monthly range, 60, at Berlin Falls; least local monthly range, 26, at Nantucket; greatest daily range, 53, at Berlin Mills, 11th; least daily range, 0, at Walpole, 12th.

Precipitation.—The average was 0.24 below the normal; greatest monthly, 6.46, at West Milan; least monthly, 1.35, at Block Island.

Wind.—Prevailing direction, northwest.—*Prof. William H. Niles, Boston, Mass., president; Prof. Winslow Upton, Providence, R. I., secretary; J. Warren Smith, Private, Signal Corps, assistant.*

NEW JERSEY.

Temperature.—The mean was 1.3 above the normal; highest monthly mean, 70.6, at Trenton; lowest monthly mean, 67.0, at Allaire; maximum, 95, at Woodbury and Imlaystown, 5th; minimum, 42, at Gillette, 30th; greatest local monthly range, 48, at Gillette; least local monthly range, 30, at Bridgeton, Readington, Trenton, and Union; greatest daily range, 48, at Readington, 30th; least daily range, 3, at Ocean City, 16th.

Precipitation.—The average was 0.89 below the normal; greatest monthly, 5.16, at Tenafly; least monthly, 0.99, at Bridgeton.

Wind.—Prevailing direction, southwest.—*E. W. McGann, Sergeant, Signal Corps, New Brunswick, in charge.*

NEW YORK.

Temperature.—Highest monthly mean, 71.5, at Eden Centre; lowest monthly mean, 58.5, at Keene Valley; maximum, 97, at Eden Centre, 30th; minimum, 30, at Sherman, 8th; greatest local monthly range, 64, at Kendall; least local monthly range, 92, at Brooklyn; greatest daily range, 46, at Keene Valley, 30th; least daily range, 3, at Palermo, 7th.

Precipitation.—Greatest monthly, 6.93, at Pendleton Centre; least monthly, 2.10, at Watervleit Arsenal.

Wind.—Prevailing direction, southwest.—*Prof. E. A. Fuytes, Ithaca, director; I. G. Gardiner, Corporal, Signal Corps, assistant.*

NORTH CAROLINA.

Temperature.—The mean was 3 below the normal; highest monthly mean, 82.4, at Fayetteville; lowest monthly mean, 66.6, at Highlands; maximum, 102, at Chapel Hill, 29th; minimum, 40, at Franklin, 8th; greatest local monthly range, 54, at Douglas; least local monthly range, 23, at Hatteras.

Precipitation.—The average was 1.65 below the normal; greatest monthly, 6.93, at Washington; least monthly, 0.52, at Charlotte.

Wind.—Prevailing direction, southwest.—*Dr. Herbert B. Battle, Raleigh, director; C. F. von Herrmann, Sergeant, Signal Corps, assistant.*

NORTH AND SOUTH DAKOTA.

Temperature.—The mean was about 4 above the normal; highest monthly mean, 72.5, at Wahpeton, N. Dak.; lowest monthly mean, 65.1, at Fort Buford, N. Dak.; maximum, 99, at Fort Sully and Rapid City, S. Dak., 25th, and at Grand Forks, N. Dak., and Woonsocket, S. Dak., 26th; minimum, 30, at Aberdeen, S. Dak., 7th; greatest local monthly range, 60, at Highmore, S. Dak.; least local monthly range, 40, at Sioux Falls, S. Dak.

Precipitation.—The average was about 1.98 above the normal; greatest monthly, 10.53, at Millbank, S. Dak.; least monthly, 2.19, at Vermillion.

Wind.—Prevailing direction, southeast.—*S. W. Glenn, Sergeant, Signal Corps, Huron, S. Dak., in charge.*

OHIO.

June was marked by unusually warm weather and excessive rainfall.

Temperature.—The mean was 3.8 above the normal; maximum, 101, at Wapakoneta, 28th; minimum, 39, at Wauseon, 8th; greatest daily range, 42, at Logan, 3d; least daily range, 7, at Sandusky, 27th.

Precipitation.—The rainfall was well distributed throughout the month, and the largest on record in this bureau for June. The average was 0.65 above the normal; greatest monthly, 8.72, at Newcomerstown.

Wind.—Prevailing direction, southwest.—*Prof. B. F. Thomas, Columbus, director; Lieut. Charles E. Kilbourne, secretary; C. M. Strong, Corporal, Signal Corps, assistant.*

OREGON.

Temperature.—The mean was 2.2 below the normal; maximum, 103, at Grant's Pass, 29th; minimum, 25, at Beulah, 2d.

Precipitation.—The precipitation was generally above the average; the greatest amount, 6.40 was reported from the Cascades, and less than one inch was reported south of the Blue Mountains.

Wind.—Prevailing direction, west.—*Hon. H. E. Hayes, Master State Grange, Oswego, director; B. S. Pague, Sergeant, Signal Corps, assistant.*

PENNSYLVANIA.

Temperature.—The mean was 2 above the normal; highest monthly mean, 73.7, at Uniontown and Huntingdon; lowest monthly mean, 64.2, at Dyberry; maximum, 97, at Carlisle, 5th, and at Lynnport, 30th; minimum, 38, at Charlesville, 14th; greatest local monthly range, 31.3, at Wilkes Barre; least local monthly range, 14, at Erie; greatest daily range, 47, at Lock Haven, 25th; least daily range, 2, at Wellsborough, 21st.

Precipitation.—The average was nearly 0.50 inch below the normal; greatest monthly, 5.74, at Forks of Neshaminy; least monthly, 1.30, at Philadelphia.

Wind.—Prevailing direction, west.—*Under direction of the Franklin Institute, Philadelphia; T. F. Townsend, Sergeant, Signal Corps, assistant.*

SOUTH CAROLINA.

Temperature.—Highest monthly mean, 84.8, at Spartanburgh; lowest monthly mean, 76.6, at Walhalla; maximum, 103, at Cheraw, 29th; minimum, 56, at Spartanburgh, 8d; greatest local monthly range, 43, at Spartanburgh; least local monthly range, 20, at Walhalla.

Precipitation.—The average was about 1.38 below the normal; greatest monthly, 4.27, at Batesburg; least monthly, 0.78, at Greenwood.

Wind.—Prevailing direction, southwest.—Hon. A. P. Butler, Columbia, director; G. E. Hunt, Sergeant, Signal Corps, assistant.

TENNESSEE.

Temperature.—Highest monthly mean, 81, at McKenzie, Woodstock, and Memphis; lowest monthly mean, 73, at Greeneville; maximum, 102, at Hohenwald, 29th, and at Watkins, 30th; minimum, 56, at Rugby, 7th, and at Jacksboro, 8th; greatest local monthly range, 44, at Hohenwald; least local monthly range, 25, at McKenzie and Covington; greatest daily range, 31, at Hohenwald, 1st; least daily range, 3, at Florence Station, Lewisburgh, and Nunnely, 5th, and at Jacksboro, 23d.

Precipitation.—The average was, with one exception (in 1887), the smallest June rainfall during the last eight years; greatest monthly, 8.36, at DuPont; least monthly, 0.69, at Kington.

Wind.—Prevailing direction, southwest.—J. D. Plunket, M. D., Nashville, director; H. C. Bate, Signal Corps, assistant.

TEXAS.

Temperature.—The mean varied slightly from the normal in all parts of the state; highest monthly mean, 83.6, at Rio Grande City; lowest monthly mean, 74.4; at Fort Elliott; maximum, 108, at Haskell and Mesquite, 30th; minimum, 38, at Hartley, 8th; greatest local monthly range, 59, at Hartley; least local monthly range, 25, at Galveston.

Precipitation.—Along the coast and over the eastern portion of the state it was generally normal, except in some localities where it was excessive, over other parts of the state it was below the normal, and none fell north of the 32d parallel and west of the 99th meridian; greatest monthly, 7.42, at Galveston; least monthly, 0.00, at Haskell.—D. D. Bryan, Galveston, director; I. M. Cline, Sergeant, Signal Corps, assistant.

Meteorological record of Army post surgeons, voluntary, and other co-operating observers, June, 1890.

Table with columns: Stations, Temperature (Fahrenheit), Precip'n. Lists weather data for Alabama, Arizona, Arkansas, California, Colorado, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming.

Meteorological record of voluntary observers, &c.—Continued.

Table with columns: Stations, Temperature (Fahrenheit), Precip'n. Continuation of weather data for various states including California, Colorado, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming.